

REMARKS

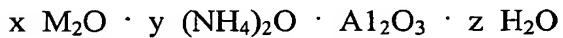
35 U.S.C. § 112

Original claim 7 stands rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness. Claim 7 is canceled. New claims 8-15 which were presented in the Preliminary Amendment filed with the application on July 22, 2002 are now pending in the application. Typographical errors are corrected in claims 8, 10 and 11-15. Extraneous markings appear in the equations of claims 8, 10, 14 and 15, and these have been deleted. Support for these amendments can be found in the originally filed claim 1. In addition, the dependency of claims 11, 12 and 13 has been corrected. Pending claims 8-15 were originally numbered as claims 7-14 in error by Applicants represented in the Preliminary Amendment. The Office Action refers to the proper numbering (8-15), and the dependency is formally corrected here.

35 U.S.C. § 102(e)

Claims 8-15 stand rejected under 35 U.S.C. § 102(e) for anticipation by U.S. Patent No. 6,342,293 to Nakahara et al. Applicants respectfully traverse this rejection for the following reasons.

The present invention is directed to alumina hydrate particles and a method of preparing the same where the alumina hydrate particles have a composition represented by the general formula:



where x, y and z are defined as follows:

$$2 \times 10^{-4} \leq x \leq 25 \times 10^{-4}$$

$$0.1 \times 10^{-4} \leq y \leq 20 \times 10^{-4}$$

$$0.6 \leq z \leq 2.5$$

The alumina hydrate particles of the present invention include ammonia in the form of $(\text{NH}_4)_2\text{O}$. Inclusion of $(\text{NH}_4)_2\text{O}$ is significant for controlling printing properties such as decoloration and for controlling sol properties such as sol stability, viscosity and transparency. The $(\text{NH}_4)_2\text{O}$ is introduced by neutralizing aluminum salt to produce an alumina hydrogel, filtering out the alumina hydrogel, washing the alumina gel and adjusting

the pH value of the washed alumina hydrogel and aging the alumina hydrogel. The resultant particles have pores sized 15-30 nm at a pore volume of 0.3-1.0 ml/g.

In contrast, the Nakahara patent is directed to a method of producing an alumina sol using aggressive stirring. The alumina sol contains alumina hydrate particles in acid-containing water. An alumina hydrate powder is obtainable by removing water from the alumina sol. The powder particles have an average pore size of at least 7 nm and a total volume of pores having pore radii from 1 to 100 nm of 0.80 to 2.00 cc/g. The transmittance of a light at a wavelength of 530 nm through an alumina sol of the powder particles at a concentration of 0.5 wt. % is 5-70%. Nakahara does not teach or suggest several aspects of the claimed invention.

Firstly, Nakahara is concerned only with the total volume of pores having radii of 1-100 nm. See, column 7, lines 41-48 which states:

“With respect to the pore structure of the alumina hydrate powder of the present invention, the average pore radius is at least 7 nm, and the total volume of pores having pore radii of from 1 to 100 nm is from 0.80 to 2.00 cc/g. With such a pore structure, the ink-receiving layer formed by a coating fluid consisting essentially of the alumina sol or the alumina hydrate powder of the present invention, is excellent in ink absorptivity.”

This passage indicates a concern with a total volume of pores having a pore radii of 1-100 nm. Nakahara does not teach or suggest controlling a volume of the pores whose diameter is from 15-30 nm to be 0.3-1.0 ml/g as required in claims 8 and 10-15.

Secondly, Nakahara fails to teach or suggest the $(NH_4)_2O$ content of claims 8 and 10-15 or the process for introducing $(NH_4)_2O$ into the alumina hydrate particles of the present invention as set forth in claim 9. The $(NH_4)_2O$ component is introduced by neutralizing an aqueous solution of an alkali metal aluminate or of an aluminum salt and washing the resultant alumina hydrogel with water and/or aqueous ammonia. The selective use of ammonia or the like of the present invention is not taught or suggested in Nakahara. Nakahara discloses preparation of alumina sol by stirring a dispersion of alumina hydrate in an aggregation treatment and adding an acid thereto in a peptization treatment. No alumina hydrogel is described as being formed. Nakahara discloses stirring the alumina hydrate dispersion at a sol content of 1 to 40 wt. % at a pH of 7 to 12. The pH value of 7 to 12 is selected in Nakahara for aggregation treatment. The aggregation treatment of Nakahara is

distinct from the aging treatment of the present invention. In the present invention, the pH of the washed alumina hydrogel is adjusted to 9-12, and the alumina hydrogel is heated at 50-105° C to age the alumina hydrogel. Aging grows the fine particles and homogenizes the particle size. Nakahara fails to disclose that the alumina hydrogel should be washed with water and/or aqueous ammonia and that the pH value of the washed alumina hydrogel should be adjusted to 9-12. Unless ammonia or the like is used, the claimed ammonia portion of the hydrate particles of the present invention is not obtained. In the present invention ammonia is interfused from the neutralizing agent of an aqueous aluminum solution, washing of the alumina hydrogel and pH adjustment during the aging step. Nakahara fails to teach or suggest these steps. As such, claim 9 defines over the Nakahara process, and the alumina hydrate particles of claims 8, 10, 11 and 15 are not taught by the Nakahara process since they cannot be made thereby.

Thirdly, the present invention requires a metal oxide (M₂O) where M is an alkali metal. Nakahara does not disclose the content of metal oxide contained in the hydrate thereof. Any alkali metal which is used in the aggregation treatment of Nakahara may remain in the resultant alumina hydrate powder. As such, the particular content of M₂O specified as the x number of moles thereof per mole of Al₂O₃, is not taught or suggested by Nakahara. In the Nakahara process, the alumina hydrate is only washed with water. Such a simple washing step cannot effectively reduce the alkali metal impurities to the level required in claims 8 and 10-15. In view of the foregoing, claims 8-15 are believed to define over the Nakahara patent.

35 U.S.C. § 103(a)

Claims 8, 10, 11 and 15 stand rejected under 35 U.S.C. § 103(a) for obviousness over EP 0934905 in view of U.S. Patent No. 4,371,513 to Sánchez et al. Applicants respectfully traverse this rejection for the following reasons.

EP '905 discloses alumina hydrate of the formula Al₂O_{3-n}(OH)_{2n+m}H₂O. There is no indication that a metal oxide or an ammonia portion is part of the hydrate as are required by claims 8 and 10-15 and would be produced using the process of claim 9. The Sanchez patent is relied upon for its teachings to use ammonia to create basic conditions for an oil-drop method of spheroidizing alumina by controlling the surfaces of Al₂O₃·H₂O particles. There is no indication that the ammonia would be an integral part of the alumina particles.

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Therefore, the combined teachings of EP '905 and Sanchez do not suggest the claimed alumina hydrate particles.

In addition, EP '905 describes a fine powder material for forming an ink-receiving layer on a recording medium, where the pore radius maximum is 9-12 nm. There is no consideration given to controlling the volume of pores sized 15-30 nm in diameter as required by claims 8 and 10-15. At best, EP '905 reports the volume of pores sized ≤ 5 nm. Such a teaching does not suggest the claimed requirement of 0.3-1.0 ml/g pore volume of pores sized 15-30 in diameter as claimed. As such, EP '905 does not suggest the alumina hydrate particles of claims 8 and 10-15.

EP '905 also fails to disclose that an alumina hydrogel is prepared by per-neutralizing an aqueous solution of an alkali metal aluminate or aqueous solution of an aluminum salt followed by washing of the resultant alumina hydrogel with water and/or aqueous ammonia. The Sanchez patent does not account for those deficiencies in EP '905 (failure to teach pore volumes for pores sized 15-30 nm in diameter and failure to teach the process steps which achieve the particle characteristics of claims 8 and 10-15). As such, EP '905 combined with the teachings of Sanchez does not teach or suggest the alumina hydrate particles of claims 8 and 10-15.

In view of the foregoing, claims 8-15 are believed to define over the prior art of record and be in condition for allowance.

Respectfully submitted,



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